3. Copper sulphides in limestone.—These ores occur only in fissured regions of limestone marmorized by the contact with monzonite. Inasmuch as it retains the bedded structure of the limestone, and shows every conceivable stage of replacement when observed microscopically, the conclusion is that it was deposited by a molecular replacement of the limestone. The source of the copper was the intrusive monzonite, while the transporting agents were hot solutions or vapors emitted from the intrusives either from the top or from great depths.

The district is a steady producer of low grade ore, and is the foremost camp of Utah in the production of copper. More of the sulphide ores are being found continually, and progress is constantly being made in the production of low-grade copper, which seems likely to prolong the mining activity of the region indefinitely.

The report is clearly written, and betrays systematic and thoroughgoing work. A. C. T.

Geology of the Tonopah Mining District, Nevada. By JOSIAH EDWARD SPURR. (Professional Paper No. 42, U. S. Geological Survey.) Pp. 295, 24 plates, 78 figures.

Ore deposits were discovered in the Tonopah district in April, 1900, by James L. Butler. The geologic structure is complex. The rocks are of volcanic origin, probably Miocene-Pliocene, except for a series of water-laid tuffs. The successive flows have been named earlier andesite, later andesite, five recognized rhyolite-dacite series, the Siebert tuffs, and finally a little basalt. The region has been profoundly faulted. It is concluded that the faulting was initiated chiefly by the intrusion of the dacitic rocks. After the intrusion there was a collapse, a sinking of the various vents. "The still liquid lava, in sinking, dragged down with it adjacent blocks of the intruded rock."

The veins occur principally in the earlier andesite, and do not extend into the over-lying rocks. Less rich veins are found in the later andesite and one of the rhyolite-dacite series. These veins are formed by replacement in fissured zones. Transverse fissures have determined the position of cross-walls and ore shoots by limiting and concentrating the circulation.

The ores contain silver sulphides, silver selenide, gold in an undetermined amount, chalcopyrite, pyrite, some galena and lead, with a gangue of quartz, adularia and some carbonates. Oxidation has occurred to varying depths, but has not reduced the amount of gold and silver.

The earlier andesite has suffered extensive alteration, near the veins to quartz, sericite, and adularia; farther away to calcite and chlorite. The principal work of the altering waters was the formation of the veins. A detailed account of these changes is given, and a study of typical specimens leads to the conclusion that these waters were charged with an excess of silica and probably potash, with gold, silver, antimony, arsenic, copper, lead, zinc, sodium, sulphur, some chlorine and fluorine; but were notably deficient in iron. By comparison and microscopic studies of the later andesite it is concluded that these altering waters were charged with carbonic acid and sulphuretted hydrogen, and contained magnesia, iron and lime.

The composition of the waters indicated above does not seem to correspond to the composition which waters descending through the rock would have had. An eruption of andesite, followed by highly siliceous and potassic waters, deficient in iron, and an eruption of rhyolite followed by waters rich in lime, magnesia, and iron, present an antithesis which may give, according to the author, some clew to the origin of the waters. Two hypotheses of this origin are considered, an atmospheric and a magmatic. The author favors the latter view.

Besides a detailed discussion of the above-mentioned facts, Mr. Spurr has chapters on the descriptive geology of the several mines and prospects; the increase of temperature with depth in the mines, and concludes the report with a comparison of similar ore deposits elsewhere. F. D. M.

Stratigraphy and Paleontology of the Upper Carboniferous Rocks of the Kansas Section. By GEORGE I. ADAMS. (Bulletin of the U. S. Geological Survey, No. 211, 1903, pp. 1–72.)

Tabulated List of Invertebrate Fossils from the Carboniferous Section of Kansas. By GEORGE H. GIRTY. (Bulletin of the U. S. Geological Survey, No. 211, 1903, pp. 73–83.)

Summary of the Fossil Plants Recorded from the Upper Carboniferous and Permian Formations of Kansas. By DAVID WHITE. (Bulletin of the U. S. Geological Survey, No. 211, 1903, pp. 85–117.)

Notes on the Permian Formations of Kansas. By CHARLES S. PROSSER. (*American Geologist*, Vol. XXXVI, 1905, pp. 142–61.)

Several important contributions have been made lately to our knowledge of the much-debated section of the Upper Carboniferous of Kansas.

The standard Carboniferous Section for America may be regarded as the one which is so fully displayed in the Mississippi valley. It is in Kan-